We claim:

1. A method for forming a trench with a buried plate, which comprises:

forming a trench in a substrate, the trench having a sidewall, an upper region, and a lower region;

forming an undoped silicon oxide layer on the trench sidewall in the upper and lower regions of the trench;

forming a doped silicate glass fill in the upper and lower regions of the trench;

removing the doped silicate glass fill and the undoped silicon oxide layer from the upper region of the trench; and

increasing temperature to diffuse dopant from the doped silicate glass fill into the substrate through the undoped silicon oxide layer and to form a buried plate in the substrate in the lower region of the trench.

2. The method according to claim 1, wherein:

the doping of the undoped silicon oxide layer is less than 10^{18} cm^{-3}; and

not further limit

the doping of the doped silicate glass fill is greater than 10^{18} cm^{-3}.

3. The method according to claim 1, which further comprises utilizing at least one of the group consisting of boron, phosphorous, and arsenic for the doping of the doped silicate glass fill.

4. The method according to claim 1, which further comprises carrying out the undoped silicon oxide layer forming step by depositing the undoped silicon oxide layer in an integrated processing step immediately prior to forming the doped silicate glass fill.

5. The method according to claim 1, which further comprises depositing the undoped silicon oxide layer in an integrated processing step immediately prior to the doped silicate glass fill.

6. The method according to claim 1, which further comprises carrying out the undoped silicon oxide layer forming step by forming the undoped silicon oxide layer to a thickness between 0.1 and 25 nm.

7. The method according to claim 1, which further comprises:

filling the trench having the doped silicate glass fill with varnish;

removing the varnish in the upper region of the trench;

removing the doped silicate glass fill and the undoped silicon oxide layer in the upper region of the trench;

removing a remaining varnish from the trench;

depositing an oxide cover layer and then increasing temperature to diffuse dopant into the substrate; and

removing the oxide cover layer, the doped silicate glass fill, and the undoped silicon oxide layer.

8. The method according to claim 1, which further comprises:

filling the trench having the doped silicate glass fill with varnish;

removing the varnish in the upper region of the trench;

removing the doped silicate glass fill and the undoped silicon oxide layer in the upper region of the trench;

removing remaining varnish from the trench;

depositing an oxide cover layer and then increasing temperature to diffuse dopant into the substrate; and

removing the oxide cover layer, and removing the doped silicate glass fill and the undoped silicon oxide layer from the lower region of the trench.

9. The method according to claim 1, which further comprises:

filling the trench having the doped silicate glass fill with a sacrificial silicon material;

removing the sacrificial silicon material, the doped silicate glass fill, and the undoped silicon oxide layer in the upper region of the trench;

subsequently increasing temperature to diffuse dopant into the substrate;

depositing an insulation trench layer in the upper region of the trench; and

removing the sacrificial silicon material, the doped silicate glass fill, and the undoped silicon oxide layer from the lower region of the trench.

10. The method according to claim 1, which further comprises:

depositing a second undoped silicon oxide layer in the trench having the doped silicate glass fill;

filling the trench with varnish;

removing the varnish, the second undoped silicon oxide layer, the doped silicate glass fill, and the undoped silicon oxide layer in the upper region of the trench;

removing the varnish in the lower region of the trench; and

subsequently increasing temperature to diffuse dopant into the substrate.